

CLAIMS

1. A transducer assembly comprising
 - a) a resonator element having
 - 5 i) a sheet-like main body and
 - ii) a mounting flange having a outer surface facing away from the main body and an inner surface facing towards the main body,
 - 10 b) first and second mounting elements engaging respectively the inner and outer surfaces to mount the resonator element
 - c) a piezoelectric body bonded to the main body, and
 - d) means for electrically connecting the piezoelectric body and the resonator element to
15 and alternating current source for energising the resonator element and causing its resonation.
2. A transducer assembly as claimed in claim 1, wherein the main body is a thin, planar, electrically
20 conductive sheet and the mounting flange extends peripherally around the whole of the main body.
3. A transducer assembly as claimed in claim 2, wherein the main body is of disc-like form, the mounting
25 flange is integral with the main body and extends transversely to the central plane of the main body to form a skirt and the mounting elements are respective rings which rigidly clamp the skirt and are adapted to mount the transducer assembly in a structure.
4. A transducer assembly as claimed in claim 3, wherein the piezoelectric body is disc-like in form and
30 extends over most of the main body and is bonded thereto by an electrically insulating compound.
5. A transducer assembly as claimed in claim 4, wherein the electrical connecting means comprises a first
35 electrical lead connected to a radially outer face of the piezoelectric body remote from the main body and a second electrical lead connected to at least one of the rings which are electrically conductive.

6. A transducer assembly as claimed in claim 5, wherein the rings engage the skirt in an interference fit and the skirt extends substantially parallel to the axis of the main body with a smoothly curved junction portion joining the main body and the skirt, with the inner ring having a corresponding curved shoulder for supporting the junction portion.
7. A transducer assembly as claimed in any one of claims 1-6 where the assembly is of circular form and of dimensions of about 2cm diameter and 2mm axial depth.
8. An acoustic emitter comprising a transducer assembly as claimed in any one of the preceding claims, a mounting, an electrical drive circuit adapted to energise the piezoelectric body at an acoustic frequency and an acoustic structure defining an acoustic path for sound generated by the resonator and extending away from the main body of the resonator on its side remote from the piezoelectric body.
9. A transducer assembly as claimed in claim 8, wherein the electric drive circuit includes connectors for connection to a battery, control circuitry and an inverter for supplying an alternate current supply at about 3kHz.
10. A transducer assembly as claimed in claim 8 or claim 9, wherein the acoustic structure includes a rigid body spaced from and adjacent to the resonator main body and having a central aperture which is small in area compared to the main body of the resonator.
11. A transducer assembly as claimed in claims 7-10, and inducting a horn device acoustically matched to the transducer assembly to control the acoustic output along the axis of the main body.
12. A transducer assembly as claimed in claim 11, wherein the horn is substantially a tapering conical shaped body having its lesser diameter remote from the main body and of a length similar to the dimensions across

the resonator main body.

13. A transducer assembly as claimed in claim 12, wherein the horn has an oval cross-sectional shape.
14. A transducer assembly as claimed in any one of
5 claims 8-12, wherein the device is arranged to provide an acoustic signal at about 3kHz, wherein the mass-spring resonance in the disc-shaped resonator is inherently at about 3kHz, the electrical drive circuit has a capacitor-inductance resonance in the circuit of
10 about 3kHz, the piezoelectric body as an inherent resonance at about 3kHz and the acoustic structure has inherent resonance at about 3kHz and has an acoustic guide wall dimensioned to transform a high pressure, small displacement in the operating fluid in the
15 structure into a low pressure, high displacement and high volume acoustic signal.
15. A device for displacing a fluid comprising
 - a) a mounting structure,
 - b) means for mounting a transducer assembly as
20 claimed in any one claims 1-7,
 - c) means for admitting an operating fluid into contact with the face of the main body of the resonator element remote from the piezoelectric body and means for displacing the fluid to a
25 remote location after interaction of the resonator when energised, and
 - d) means for energising the piezoelectric body.
16. An acoustic transducer assembly comprising a generally planar diaphragm having piezoelectric transducer
30 material in a central portion and a mounting flange extending from a peripheral portion transversely to the generally planar diaphragm, and first and second mounting elements engaging and mounting the flange on its inner and outer sides respectively whereby an
35 assembly is adapted to be mounted for acoustic output when the piezoelectric transducer is electrically driven.

17. An assembly as defined in claim 16 and wherein the diaphragm is disc-shaped with the flange being a depending skirt extending approximately at right angles to the general plane of the diaphragm.
- 5 18. An assembly as defined in claim 17 and wherein the first and second mounting elements are respective rings and the skirt is of corresponding shape to be clamped between the rings in an interference fit.